UNITED STATES

PRELIMINARY VIEWS ON WRC-2000

WRC-2000 Agenda Item 1.13: *on the basis of results of the studies in accordance with Resolutions 130(WRC-97), 131(WRC-97), and 538(WRC-97):*

> **1.13.1:** *to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite ~~service(~~service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;*
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> **1.13.2:** *to consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations;*

ISSUE: Regulatory and technical provisions to enable sharing among non-GSO FSS, GSO FSS, GSO BSS, space sciences and terrestrial services.

BACKGROUND: WRC-97 adopted provisional power flux density limits in certain frequency bands which would apply to non-GSO FSS systems to protect GSO FSS networks, and GSO BSS networks. Resolution 130 (WRC-97), *Use of Non-Geostationary Systems in the Fixed-Satellite Service in Certain Frequency Bands* and Article S22.2 of the Radio Regulations contain provisional limits corresponding to an interference level caused by one NGSO system in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz, and 19.7-20.2 GHz. Resolution 538, *Use of the Frequency Bands Covered by Appendices 30 and 30A by Non-GSO Systems in the Fixed-Satellite Service*, and Article S22 contain limits corresponding to ~~an~~ permissible levels of interference ~~level~~ from a NGSO system into a GSO BSS network. Resolution 131 (WRC-97), *Power Flux-Density Limits Applicable to Non-GSO FSS Systems for Protection of Terrestrial Services in the Bands 10.7-12.75 GHz and 17.7-19.3 GHz*, and Article S21 contain limits to protect terrestrial services. Resolution 131 requests review of the provisional limits and ~~and~~ calls for further study of current ~~non-provisonal~~ pfd limits.

PRELIMINARY VIEW:

1. The U.S. continues to review the power limits -- both the provisional limits adopted in Article S22 and those contained in WRC-97 Resolutions 130 and 538, and the limits in Article S21 and WRC-97 Resolution 131 -- with the intent of protecting the GSO FSS, GSO BSS, space sciences, and terrestrial services while allowing the introduction of NGSO FSS systems.

2. The APFD definition in the Radio Regulations should be modified to take into account the normalized directivity of the GSO satellite antenna. (For ease of computation, the WRC-97 APFD definition did not take into account the GSO satellite antenna pattern.) The corresponding APFD limits would consist of ~~several~~ different values ~~that are associated with various GSO satellite reference antenna patterns~~for the different frequency bands. Due to the differing spacecraft design practices in

Ku- and Ka-bands, the satellite reference antenna ~~directivity~~ patterns ~~may~~ should also vary with frequency band.

3. GSO systems operating in slightly inclined orbits constitute an important subgroup of all operational satellites and need to be protected from NGSO interference.

4. Outside of those bands where provisional power limits were adopted by WRC-97, no technical basis has been established for consideration by WRC-2000 of the power limits approach to sharing between and/or among NGSO FSS systems and GSO FSS, GSO BSS, space sciences, and/or terrestrial services systems. Therefore, the U.S. opposes general application or power limits outside those bands where provisional power limits were adopted at WRC-97.

5. Sharing with satellite systems in "quasi-geostationary satellite orbit" needs to be considered within this agenda item.

Further views are given below grouped by issue.

NGSO/GSO

6. There will be a need for an alternative approach to facilitate sharing in some specific situations. Transmissions to earth stations with large antennas need to be protected from NGSO interference. The provisional epfd limits and associated time allowances do~~may~~ not adequately protect existing GSO FSS networks with large earth station antennas (large earth station antennas will be defined as a result of technical work within the ITU-R. EPFD limits and associated percentages of time that would provide sufficient protection to GSO networks having large earth station antennas would be substantially more stringent than limits that would protect other sensitive links. It is therefore desirable that GSO networks having large earth station antennas be treated separately from other sensitive links in order to avoid imposing undue constraints on the development of NGSO systems while protecting these GSO networks. The U.S. favors coordination between NGSO FSS networks and these GSO FSS networks. Regulatory procedures to allow an administration to identify the need for coordination and initiate the applicable coordination process are needed and may include additions or modifications to Articles S5, S9, and S22 and Appendices S4 and S5. Thresholds based on GSO earth station antenna gain and protection criteria might be used in determining a need to coordinate.

NGSO/BSS

7. The study of the provisional power flux-density limits by the ITU-R and the review of these limits by WRC-2000 must ensure protection of modifications to the BSS Plans, including currently pending modifications and future modifications to the Plans.

8. The majority of BSS systems that have been implemented, or will be implemented in the future, are modifications to the Plans. In addition, more than three years can lapse between the submission of Annex 2 information regarding proposed modifications to the Plans by an administration, and the actual publication of this information by the BR. This can result in substantial delays in completion of the modification process, even for modifications of existing frequency assignments. WRC-97 (in both Resolution 538 and Resolution 721, agenda item 1.13) clearly foresaw the need to protect future

modifications to the Plans from NGSO FSS systems, and to ensure that these limits do not impose undue constraints on the development of these systems and services (as stated in agenda item 1.13).

NGSO/Terrestrial Services

9. Characteristics of radars currently operating in the bands 13.75-14.0 GHz have been examined. Radars operating in the 13.75-14.0 GHz band employ e.i.r.p. values of up to 79 dBW. Interference from these radiolocation stations to NGSO FSS networks would appear to be probable and sharing may not be feasible. Footnotes S5.502, S5.503, and S5.503A were adopted at WRC-92 and WRC-95 to facilitate sharing between radiolocation, radionavigation, space research, and fixed satellite services in this band. Footnote S5.502 states that the eirp radiated by a station in the radiolocation or radionavigation services toward the geostationary orbit may not exceed 59 dBW and that earth stations in the fixed satellite service must have an eirp between 68 dBW and 85 dBW and a minimum antenna diameter of 4.5 meters. These restrictions are necessary for the protection of FSS carriers from radar interference and also minimize the possibility of unacceptable interference to the space research, radiolocation and radionavigation services. This delicate balance must be maintained in order to avoid unacceptable constraints on or interference to the services involved; therefore the U.S. opposes any change to footnotes S5.502 and S5.503.

10. Characteristics of radars currently operating in the band 17.3-17.7 GHz have been examined. Space tracking ~~R~~radars operating in the band 17.3-17.7 GHz employ e.i.r.p. values up to 11~~65~~ dBW directed at a satellite over extended periods of time. Sharing was found to be feasible with GSO FSS systems (Earth-to-space) if the radiolocation stations limit their emissions toward the geostationary orbit. Radiolocation station emissions toward a NGSO satellite could be 66 dB higher than toward the geostationary orbit. Sharing ~~would not appear to be~~ is not feasible between radiolocation stations and NGSO FSS networks. The U.S. opposes the introduction of NGSO FSS systems in this band in Region 2 (there is currently no allocation for the use of the band 17.3-17.8 GHz systems in Region 2).

NGSO/Space Science Services

11. Earth stations operating in the 13.75-14.0 GHz band are technically constrained by S5.502 (minimum size of 4.5 meters; e.i.r.p. between 68 and 85 dBW), S5.503 (e.i.r.p. density in the band 13.772-13.778 MHz), and S5.503A (FSS shall not cause harmful interference to radiolocation stations installed on NGSO space stations in the space research and Earth exploration-satellite services until January 1, 2000). In addition, there are ITU-R Recommendations (e.g., ITU-R S.1068 (Fixed-satellite service and radiolocation/radionavigation services sharing in the band 13.75-14.0 GHz) and ITU-R SA.1071 (Use of the 13.75 to 14.0 GHz band by the space science services and the fixed-satellite service)) that describe sharing situations with the fixed-satellite service, including recommended limitations on the FSS. These footnotes and recommendations will have to continue to be applied to both GSO and NGSO systems operating in the band.